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EXAMINER

PATEL, HARESH N

ART UNIT PAPER NUMBER

2154

DATE MAILED: 02/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/746,877

Applicant(s)

RAZ ET AL.

Examiner

Haresh Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

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DETAILED ACTION

1. Claims 1-44 are presented for examination.

Information Disclosure Statement

2. An initialed and dated copy of Applicant's IDS form 1449, paper number 12, is attached to the instant Office action.

Drawings

3. Figure 1 has been replaced with a same figure contents and designated as --Prior Art--.

Response to Arguments

4. Applicant's arguments with respect to claims 1-44 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-3, 6, 10-16, 19, 24-27, 30, 34-37, 40, 44, are rejected under 35 U.S.C. 102(e) as being anticipated by Wolf et al. 6,463,508 (Hereinafter Wolf).

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7. As per claims 1, 13, 14, 25 and 35, Wolf teaches the following:

a system for streaming a software application to a plurality of clients, the system comprising,

a server for use in a system for streaming a software application to a plurality of clients comprising,

in a system for streaming a software application as blocks from a principal server to at least one client having at least one intermediate server between the principal server and the client, each intermediate server connected to at least one upstream device and at least one downstream device, each device comprising one of the principal server, a client, and another intermediate server, a method for improving the deliver of the software application comprising the steps of,

a computer program product for use a system for streaming a software application as blocks from a principal server to at least one client having at least one intermediate server between the principal server and the client, each intermediate server connected to at least one upstream device and at least one downstream device, each device comprising one of the principal server, a client, and another intermediate server, the computer program product comprising computer code to configure an intermediate server to:

a principal server (e.g., a content server or another proxy server, col., 2, line 27 – col., 5, line 8) having the software application (e.g., streaming video and audio, col., 2, line 27 – col., 5, line 8) stored thereon as a plurality of blocks (e.g., media segments, media objects or files, which include video and audio streams, col., 2, line 27 – col., 5, line 8), and comprising a

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principal predictive streaming application configured to predict blocks which will be required by devices connected to the principal server, and a principal streaming communication manager configured to transmit predicted blocks to designated devices connected to the principal server and service requests for blocks issued from downstream devices (e.g., In commonly owned U.S. Pat. No. 5,878,223, entitled "System and Method for Predictive Caching of Information Pages", the server determines and sends the pages predicted to be requested next to the requesting computer without a specific request by the user. This is basically a sender initiated approach. In commonly owned U.S. patent application Ser. No. 08/939,277, entitled "Method for Dynamically Prefetching Information via a Server", now U.S. Pat. No. 6,085,193, a prefetching method is provided which can incorporate user specific information dynamically into the object selections. This provides an improved method for prefetching in a proxy hierarchy in order to reduce object access through the network (internet) by analyzing and identifying the common user reference patterns at the content server and proxy sites and providing Prefetch Hint Information (PHI) on related accesses via meta information piggybacked with the requested object. The PHI gets updated as the object passes through the proxy hierarchy to reflect prefetch operations performed and caching status at the higher levels of the hierarchy, and other considerations such as local reference patterns, col., 1, line 8 – col., 2, line 56),

at least one intermediate server connected between the principal server and the plurality of clients (e.g., proxy server connected to another proxy server, content server, clients, etc., col., 2, line 27 – col., 5, line 8), each intermediate server connected to at least one upstream device (e.g., content server or proxy server, col., 2, line 27 – col., 5, line 8), and at least one downstream device (e.g., proxy server or client, col., 2, line 27 – col., 5, line 8), and

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comprising a cache (e.g., auxiliary stack, LRU stack, Cache manager, etc of proxy server, figure 2), a respective intermediate predictive streaming application configured to predict blocks which will be required by connected downstream devices (e.g., According to another aspect of the invention, if only a portion of a media stream is cached in the proxy server when the stream is requested, the remaining segments are prefetched. Thus, upon receipt of a media request, the proxy can immediately serve the request using the segments cached, and compose and issue a prefetch request to obtain the remaining blocks for segments which are not currently cached, abstract), and a respective intermediate streaming communication manager (e.g., media object request manager of proxy server, figure 2);

each respective intermediate streaming communication manager configured to (a) transmit predicted blocks to designated downstream devices (e.g., proxy server sending media streams to clients or another proxy server, col., 2, line 27 – col., 5, line 8),

(b) service requests for blocks issued from downstream devices (e.g., media request from a client to the proxy server, col., 2, line 27 – col., 5, line 8),

(c) cache blocks received from connected upstream devices (e.g., proxy server caching media streams from content server or another proxy server, col., 2, line 27 – col., 5, line 8), and

(d) issue requests for a particular block to an upstream device when the particular block is needed for transmission to a downstream device and is not present in the cache (e.g., compose and issue a prefetch request to obtain the remaining blocks for segments which are not currently cached, abstract)

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wherein each of said device connected to the principal server comprises one of an intermediate server and a client (e.g., a proxy server or a content server connected to a proxy server and a client, col., 2, line 27 – col., 5, line 8).

8. As per claims 2, 3, 6, 10-12, 15, 16, 19, 24, 26, 27, 30, 34, 36, 37, 40, 44, Wolf teaches the following:

the intermediate predictive streaming application is configured to predict blocks which will be required by immediate downstream descendant devices to the server (e.g., another proxy server or client, col., 2, line 27 – col., 5, line 8),

the intermediate streaming communication manager is configured to request blocks from upstream devices in accordance with the prediction of blocks which will be required by downstream devices (e.g., proxy server requesting blocks from another proxy server or content server for the client or another proxy server, col., 2, line 27 – col., 5, line 8),

issuing requests from the intermediate server to the upstream device for blocks which have been predicted to be required by a connected downstream device and are not in the intermediate server cache (e.g., proxy server requesting blocks from another proxy server or content server for the client or another proxy server, col., 2, line 27 – col., 5, line 8),

determining the cost to replace particular blocks in the intermediate server; and in response to an indication that a cache purge is required at the intermediate server, selecting at least one block to purge from the intermediate server cache in accordance with the determined cost (e.g., Those skilled in the art will appreciate that alternative criteria may be devised for replacing a media segment. Generally, the replacement algorithm may assign a value to each

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media object. It then identifies the object with the least value and replaces its segments starting from the last segment i.e. the segment furthest away from the start) cached. The object value function can take into account the object access frequency, its time since last reference, its access time and the object size. (In the preferred embodiment, the reference frequency is used as the object value function.) Preferential treatment may be given to the first KMIN segments so they may not be replaced by later segments (i.e., segments with a segment number larger than KMIN). Still another alternative is a cache replacement policy that replaces the least valuable segment based on any segment value function, col., 6, line 7 – col., 8, line 61),

the intermediate communication streaming manager is further configured to determine the cost to replace particular blocks in the cache with reference to cached contents at connected devices (e.g., Those skilled in the art will also appreciate that although in the preferred embodiment the admission control and caching managers are invoked after the delivery of the media object is completed, these routines may additionally be invoked right after each segment is delivered to determine whether that segment needs to be cached, col., 6, line 7 – col., 8, line 61),

generate a reference value for each block in the associated cache related to a cost to replace the particular block in the cache; and upon a determination that a cache purge is required, select at least one block to purge from a set of blocks having a reference value exceeding a predefined threshold (e.g., Those skilled in the art will appreciate that alternative criteria may be devised for replacing a media segment. Generally, the replacement algorithm may assign a value to each media object. It then identifies the object with the least value and replaces its segments starting from the last segment i.e. the segment furthest away from the start) cached. The object value function can take into account the object access frequency, its time since last reference, its

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access time and the object size. (In the preferred embodiment, the reference frequency is used as the object value function.) Preferential treatment may be given to the first KMIN segments so they may not be replaced by later segments (i.e., segments with a segment number larger than KMIN). Still another alternative is a cache replacement policy that replaces the least valuable segment based on any segment value function, col., 6, line 7 – col., 8, line 61),

the cost for a respective block is determined with reference to at least one of
a block size;

a cost in CPU tasks to stream the respective block to the intermediate server from a
connected device which is an alternative source of the respective block;

quality of transmission line to the alternative source of the respective block;

type of transmission line to the alternative source of the respective block;

cost to store and maintain the block at the particular intermediate server;

distance in network nodes to the alternative source of the respective block; and

frequency of use of the respective block (e.g., segments with a segment number larger than KMIN). Still another alternative is a cache replacement policy that replaces the least valuable segment based on any segment value function, col., 6, line 7 – col., 8, line 61).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. Claims 4, 7-9, 17, 21, 28, 29, 31-33, 38, 39, 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf in view of Arlitt et. al. 6,272,598 (Hereafter Arlitt).

10. As per claims 4, 7-9, 17, 21, 28, 29, 31-33, 38, 39, 41-43, Wolf does not specifically mention about the details of cache manager communicating with other connected devices.

Arlitt teaches the following:

the intermediate communication streaming manager is further configured to broadcast to at least some of the connected devices indications of caching and purging events, the cost is determined with reference to cached contents at connected devices, the intermediate streaming communication manager is further configured to recalculate the reference values for blocks in the associated cache upon a receipt of a broadcast from a connected device indicating a change in cache contents at that connected device, the intermediate streaming communication manager is further configured to broadcast to at least some of the connected devices indications of caching and purging events, to recalculate the reference values for blocks in the associated cache upon a receipt of a broadcast from a device connected to the server indicating a change in cache contents at that connected device, recalculating the reference values for blocks in the intermediate server cache upon a receipt at the intermediate server of broadcast from a connected device indicating a change in cache contents at that connected device, broadcasting from the intermediate server to at least some devices connected to the server indications of caching and purging events at the intermediate server (e.g., Upon receiving an object for caching from the cache manager 204, the first cache device in each of the storage areas 206-206n determines whether the received object

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is to be stored in the first cache device or not. For example, the cache device 300 of the storage area 206 determines if the object received from the cache manager 204 to the storage area 206 is to be stored in the cache device 300. If so, the cache device 300 stores the object. If not, the cache device 300 sends the object to the next cache device 301. The cache device 301 then determines if the object is to be stored in the cache device 301 or not. The process continues until the object is finally stored in the appropriate one of the cache devices 300-300n. This caching and replacement process is the same as the process described above in connection with FIG. 4, which will not be described in more detail below (e.g., col., 2, line 43 – col., 9, line 55).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wolf with the teachings of Arlitt in order to facilitate a cache manager to communicate with other connected devices. The motivation would be obvious because the stream manager can consider purging the data modules considering the contents at the caches of the other connected devices. The intermediate devices providing the streaming data to the client would consider eliminating the redundant data modules compared to the non-redundant data modules when purging is necessary, as suggested by Arlitt.

11. Claims 5, 18, 20, 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf and Arlitt in view of Heddaya et. al. 6,205,481 (Hereinafter Heddaya)

12. As per claims 5, 18, 20, 22, 23, Arlitt teaches the following:

the intermediate communication streaming manager is configured to broadcast caching and purging event indications to connected devices (e.g., Upon receiving an object for caching from the cache manager 204, the first cache device in each of the storage areas 206-206n

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determines whether the received object is to be stored in the first cache device or not. For example, the cache device 300 of the storage area 206 determines if the object received from the cache manager 204 to the storage area 206 is to be stored in the cache device 300. If so, the cache device 300 stores the object. If not, the cache device 300 sends the object to the next cache device 301. The cache device 301 then determines if the object is to be stored in the cache device 301 or not. The process continues until the object is finally stored in the appropriate one of the cache devices 300-300n. This caching and replacement process is the same as the process described above in connection with FIG. 4, which will not be described in more detail below (e.g., col., 2, line 43 – col., 9, line 55).

However, Wolf and Arlitt do not specifically mention that the cache manager is communicating with other direct descendant or direct ancestor devices and the devices connected to the server are in a tree configuration.

Heddaya teaches the following:

devices connected to the server are organized in a tree configuration and the communication streaming manager is configured to broadcast caching and purging event indications to direct descendant and direct ancestor devices connected to the server (e.g., These neighborhood discovery packets are then intercepted by a given snooper at another node having a cache server 16 in the tree. It is then responsibility of the intercepting cache server 16 to send a reply to the resource manager 24 at the cache server 16 that issued the neighborhood discover packet, announcing that it is a parent (e.g., that it is closer to the home server 20 than the issuing cache server) and the identity of the tree T that it is on. The destination port for neighborhood discover packets may be assigned an unlikely port number, to ensure that the destination home

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server 20 does not attempt to process un-intercepted neighborhood packets. A hop count field can also be used to limit neighborhood discover packets from excessive forwarding, col., 3, line 24 – col., 15, line 63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wolf and Arlitt with the teachings of Heddaya in order to facilitate a cache manager to communicate with other directly connected devices in a tree structure. The motivation would be obvious because the entire Internet can be thought of as a forest of trees or graphs, each rooted at a different home server 20 which is responsible for providing an authoritative permanent copy of some set of documents. Copies of documents are located in the network at cache servers, and hence the diffusion of load, is constrained to nodes in the tree structure, This avoids the need for clients to lookup the locations of cache copies, either by directly contacting the home server 20, or a naming service such as a Domain Name Service (DNS), or by probing the network in search of appropriate cache copies, as suggested by Heddaya.

Conclusion

13. This application is a continuation in part of application number 09/120,575, which does not teach the entire claim limitations of independent claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Haresh Patel whose telephone number is (703) 605-5234. The examiner can normally be reached on Monday, Tuesday, Thursday and Friday from 10:00 am to 8:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee, can be reached at (703) 305-8498.

The appropriate fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Haresh Patel

February 3, 2004.



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